

WHAT IS CLAIMED IS:

[C001] An oxidant distribution system for a fuel cell assembly comprising:
a fuel cell having at least one oxidant inlet and at least one oxidant outlet;

a housing surrounding said fuel cell; and

an insulation layer interposed between said housing and said fuel cell,
said insulation layer defining at least a first cavity adjacent said at least one oxidant inlet for
channeling oxidant flow to said at least one oxidant inlet.

[C002] An oxidant distribution system in accordance with claim 1, wherein
said system further comprises an oxidant supply feed in flow communication with said first
cavity.

[C003] An oxidant distribution system in accordance with claim 2, wherein
said first cavity is shaped such that a first portion of said first cavity adjacent said oxidant
supply feed substantially mates with said supply feed and a second portion of said first cavity
adjacent said oxidant inlet substantially mates with said oxidant inlet.

[C004] An oxidant distribution system in accordance with claim 3, wherein
the cross-sectional size of said second portion is greater than the cross-sectional size of said
first portion thereby creating a diffuser to distribute supplied oxidant more uniformly to said
oxidant inlet of said fuel cell.

[C005] An oxidant distribution system in accordance with claim 1, wherein
an internal surface of said first cavity is roughened to enhance turbulent flow therethrough.

[C006] An oxidant distribution system in accordance with claim 1, wherein
said insulation layer comprises rigid refractory material.

[C007] An oxidant distribution system in accordance with claim 6, wherein
said rigid refractory material comprises a ceramic.

[C008] An oxidant distribution system in accordance with claim 1, further comprising a second cavity defined by said insulation layer adjacent said at least one oxidant outlet for channeling oxidant flow from said at least one oxidant outlet.

[C009] An oxidant distribution system in accordance with claim 8, wherein said system further comprises an oxidant exit port disposed within said second cavity.

[C010] An oxidant distribution system in accordance with claim 9, wherein said second cavity is shaped such that a first portion of said second cavity adjacent said oxidant exit port substantially mates with said exit port and a second portion of said second cavity adjacent said oxidant outlet substantially mates with said oxidant outlet so as to channel oxidant flow from said fuel cell.

[C011] An oxidant distribution system in accordance with claim 10, wherein the cross-sectional size of said first portion is greater than the cross-sectional size of said second portion thereby creating a reducer to remove supplied oxidant from said oxidant outlet of said fuel cell.

[C012] An oxidant distribution system in accordance with claim 11, wherein an internal surface of said second cavity is roughened to enhance turbulent flow there through.

[C013] An oxidant distribution system in accordance with claim 1, wherein said fuel cell is a high temperature fuel cell.

[C014] An oxidant distribution system in accordance with claim 1, wherein said fuel cell is a solid oxide fuel cell.

[C015] An oxidant distribution system for a fuel cell assembly comprising:

- a fuel cell having an array of oxidant inlets and at least one oxidant outlet;
- a housing surrounding said fuel cell; and

an insulation layer interposed between said housing and said fuel cell, said insulation layer defining an array of channels, wherein a respective channel within said array is matingly positioned adjacent to at least one respective inlet for channeling oxidant flow to said at least one respective inlet.

[C016] An oxidant distribution system in accordance with claim 15, wherein said system further comprises an oxidant supply feed in flow communication with said array of channels.

[C017] An oxidant distribution system in accordance with claim 15, wherein said insulation layer comprises rigid refractory material.

[C018] An oxidant distribution system in accordance with claim 17, wherein said rigid refractory material comprises a ceramic.

[C019] An oxidant distribution system in accordance with claim 15, wherein said fuel cell is a high temperature fuel cell.

[C020] An oxidant distribution system in accordance with claim 15, wherein said fuel cell is a solid oxide fuel cell.

[C021] A method of oxidant distribution within a fuel cell comprising the steps of:

forming at least one oxidant flow channel within an insulation layer of said fuel cell;

aligning said at least one oxidant flow channel with at least one oxidant inlet to said fuel cell; and

providing oxidant flow through said at least one oxidant flow channel to said at least one oxidant inlet.

[C022] A fuel distribution system for a fuel cell assembly comprising: a fuel cell having at least one fuel inlet and at least one fuel outlet;

a housing surrounding said fuel cell; and

an insulation layer interposed between said housing and said fuel cell, said insulation layer defining at least a first cavity adjacent said at least one fuel inlet for channeling fuel flow to said at least one fuel inlet.

[C023] A fuel distribution system for a fuel cell assembly comprising:

a fuel cell having an array of fuel inlets and at least one fuel outlet;

a housing surrounding said fuel cell; and

an insulation layer interposed between said housing and said fuel cell, said insulation layer defining an array of channels, wherein a respective channel within said array is matingly positioned adjacent to at least one respective fuel inlet for channeling fuel flow to said at least one respective fuel inlet.

[C024] A method of fuel distribution within a fuel cell comprising the steps of:

forming at least one fuel flow channel within an insulation layer of said fuel cell;

aligning said at least one fuel flow channel with at least one fuel inlet to said fuel cell; and

providing fuel flow through said at least one fuel flow channel to said at least one fuel inlet.